these beetles were found to vector spores of various *Ophiostoma* spp. Based on these results, our view is that these mites act as primary vectors of the *Ophiostoma* spp. in *Protea* infructescences.

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Wound callose synthesis in response to Russian wheat aphid and Bird cherry-oat aphid feeding on barley cv Clipper

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Callose deposition is a response to wounding and may occur rapidly after plant cell damage. The patterns of callose deposition and gene expression as a result of aphid infestation were investigated in barley (*Hordeum vulgare* cv Clipper), using the Russian wheat aphid (RWA), *Diuraphis noxia* Mordvilko and the Bird cherry-oat aphid (BCA), *Rhopalosiphum padi* L. The former species causes chlorosis and necrosis symptoms whereas BCA gives no visible symptoms. Wound callose deposition in longitudinal veins was observed in RWA-infested leaves after 24 h of infestation, using aniline blue fluorochrome stain for callose and fluorescence microscopy. The deposition was pronounced after 72 h, progressing during prolonged terms (7–14 days) of infestation. In contrast, no callose deposition was found in BCA-infested leaves even after 72 h, except for callose associated with sieve plate pores and pore-plasmodesmal units, which was similar to results observed in control plants. Limited callose formation was observed even after the 7–14 day time period. The results suggest that wound callose development may be partly responsible for the symptoms resulting from RWA feeding. In order to investigate whether the observed differences in callose deposition are regulated at the transcriptional level, the expression of gene sequences coding for callose synthases and β-1,3-glucanases were studied using real-time PCR. The results showed similar expression of callose synthases in control and aphid-infested tissue, but stronger expression of two β-1,3-glucanases induced by aphids, by RWA compared with BCA. This suggests that synthesis of callose was not regulated at the transcriptional level. The role of the β-1,3-glucanases is as yet not established.

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Determination of cytotoxic activity and antimicrobial effects of selected medicinal plants against clinical isolates of *Campylobacter* species and *Entamoeba histolytica*

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Campylobacter jejuni and *Entamoeba histolytica* are both aetiological agents of diarrhoea worldwide. The quest for alternative therapeutic remedies necessitated the need to ascertain the antimicrobial activity of medicinal plants against both pathogens. The safety of the use of the plants was also tangential to this investigation. In this study, the antimicrobial activity of 18 plants traditionally used to treat diarrhoea and other intestinal complains in Venda, South Africa, was determined against 110 clinical isolates of *Campylobacter* spp. Six of these plants were selected based on previous activity and tested against a standard strain of *Entamoeba histolytica*. The cytotoxicity of 14 of the plants was determined on vero cell culture. All the tests were conducted using the microdilution assays. At least one extract of each plan was active against the *Campylobacter* isolates. *Lippia javanica* and *Pterocarpus angolensis* were the most active against *Campylobacter* spp. with MICs of 90 μg/ml. Of the plants tested, only *Pterocarpus angolensis* and *Syzigium cordatum* were active against *E. histolytica* with MICs of 1.2 and 7.5 mg/ml respectively. Most plants showed low toxicity on the vero cells with IC_{50}> 400 μg/ml while *Bauhinia galpini* was the most toxic with IC_{50} of 2.7±2.5 μg/ml. Results obtained point to the potential safety and effectiveness of the active components of the plants as anti-diarrhoeal candidate templates for eventual drug design.

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Unravelling the mystery of tree water uptake along a Namibian ephemeral river — Which tree gets what and from where?

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In this paper we investigate the water use strategies of three riparian tree species (*Acacia erioloba*, *Faidherbia albida* and *Tamarix usneoides*), growing mid-river and on the riparian fringes of the ephemeral Kuiseb River in the Namib Desert. We used stable hydrogen and oxygen isotopes (δD and δ^{18}O) to determine the dependency of these trees on groundwater, fog, soil water and floodwater. In addition, we determine water stress

(Xylem Pressure Potentials) and transpiration rates for all the species both mid-river and on the riparian fringe. The isotope results suggest that two of the species at both locations depend primarily on a mixture of ground − and soil water. None of the *T. usneoides* specimen (at either location) had a signature that corresponded directly to groundwater. Instead, they lined up with the signatures of either floodwater, or fog water, or that of shallow soil layers. Pre-dawn xylem pressure potential, determined with a Scholander Pressure Chamber, was used as an indicator for water stress. The results suggest that the fringe and mid-river stands are equally water stressed, supporting the isotopic findings of equal access. However, transpiration rates suggest that the fringe vegetation transpires less than lush mid-river stands. Dendrometer measurements also indicate that the fringe vegetation has slower growth rates than the mid-river vegetation. Hence we argue that both mid river and riparian fringes have access to the same water sources, but mid-river stands access greater water quantities, as reflected in transpiration and growth rates. We suggest that slower growth rates coupled with lower transpiration rates for the riparian fringe trees suggest that increased abstraction will affect the distribution of these trees. Trees growing mid-river may take on the characteristics of the fringe trees, fundamentally changing the demography of the river system.

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An insight into the colour changes of selected commercial *Leucadendron* cultivars

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Colour quality of involucral leaves of various cultivated *Leucadendrons* largely determines their exportability. A fairly rapid colour loss is reported for both red and yellow cultivars, making the product less desirable in the international market. To manipulate colour development successfully we need to understand the underlying mechanisms responsible for the observed colour changes. The aim of this study was firstly to understand the natural colour development patterns in yellow and red *Leucadendron* cultivars in conjunction with flower development. Secondly to determine the pigments involved in the observed colour changes, as well as determining the origin and possibly the type of the trigger(s) responsible for the observed colour changes. Anthocyanin, chlorophyll and carotenoid fluctuations were monitored throughout the season for the red cultivar Safari Sunset and yellow cultivar Goldstrike. Colour development patterns in both cultivars were closely linked to flowering, indicating a possible common functional role in pollination. To determine the origin of the trigger(s) responsible for the observed colour changes, the terminal inflorescences were removed in 'Goldstrike' prior to flowering. In disbudded shoots the flower head remained green, thus a strong indication that the terminal inflorescence is the origin of the trigger(s) for the observed developmental colour patterns. Thus far we are still investigating the type of trigger involved.

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When the growing gets burnt can the buried keep growing? Above and below ground recovery rates of *Acacia karroo* after fire

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There is a growing recognition of the role of fires in controlling the structure and density of trees and shrubs in savannas. With a global trend towards tree densification in rangelands and savannas fire is viewed as a tool that can slow or even reverse this transition. Although fires often cause stem death or topkill most savanna trees resprout from the surviving rootstock. Thus in the short term fires do little to change the density of trees in a savanna but rather affect the structure of the tree community. This study investigated the recovery rate of the spindle form of *A. karroo* found in the Hluhluwe-Imfolozi Park, KwaZulu-Natal. Under the hypothesis that repeated burns can continually lower a plant's reserves and eventually cause mortality we tested whether the affect of one fire is carried over into the next season. C^{14} labelling experiments showed that root reserves are remobilised to fuel initial resprouting. Root starch concentrations of burnt resprouting plants were lower than unburnt plants but recovered to pre-fire or unburnt levels after one season if protected from defoliation. Trees that were subject to high levels of defoliation failed to replenish their root reserves highlighting the interaction between fire and browsing in the top-down controls of the tree layer. The root starch concentrations of both unburnt and burnt plants are depleted over the growing season but are replenished over the dry season which adds support to the growing evidence that the season of burning in addition to the intensity and frequency is important in terms of its affect on trees and shrubs.

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Isolation of an antiplasmodially active sesquiterpene lactone from South African indigenous medicinal plant *Warbugia salutaris*

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